ADAPTATIONS IN SCIENCE EQUIPMENT AND INSTRUCTIONAL MATERIAL FOR DISABLED CHILDREN AT ELEMENTARY STAGE

REPORT OF ACTIVITIES
(1.4.1992 - 30.9.1992)

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PREFACE

In the present society the science education has a great importance in shaping the childrens' attitude in order to harness their best potential. The growing paucity of trained scientific manpower can be partially met by taking along the handicapped children. Keeping in view the need of the handicapped children, this department has undertaken the work on development of science equipment and instructional material suited for their education at elementary stage. I am pleased to report the work done for the six months' period on this project. First prototype equipment for measurement of weight, length, volume of solids and liquids and temperature have been developed alongwith instructional sheets for the visually handicapped children. These equipment and materials will be tried out in various schools before finalization. This process will continue to cover Environmental Studies(Science) for classes III,IV and V to adapt various items of primary science kit improved recently by this department.

The development work was initiated in collaboration with Prof. N.K. Jangira, Department of Teacher Education, Special Education and Extension Services. Subsequently, a UNICEF assisted PIED project has been undertaken since April, 1992 by Dr.H.O.Gupta, Reader in this department. My thanks are due to Prof. P.K.Bhattacharyya, DESM, Prof. N.K. Jangira, Shri C.D. Tamboli, Reader of DTESE&ES for taking keen interest in the project. I am thankful to the technical staff of this department specially to Shri K.L.Mathur, Technical Officer, Shri Kamal Kishore and Shri Balbir Singh for fabrication of the first prototype measurement equipment. Thanks are also due to Shri Krishan Chand, J.P.F. for help in developing various items, engaged for this project and to Shri Ishwar Chand, APC for administrative help and Mrs.Kanchan Mehra, PA for secretarial help of this department

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1. Introduction

Education for all(including disabled children) is considered one of the basic rights of the Indian people. Science education has an important role to play in general basic education. The teaching of science at the foundation stage of schooling deserves utmost care. But it is often given a low priority in special education. The disabled children have as great a need as anyone else also to learn about the world around them where scientific and technological advancement affects everybody's life. A person with a disability is not a different kind of citizen but an ordinary citizen with special needs. In this endeavour, we have tried to identify the special needs as far as teaching of science at primary level is concerned.

Students receive their first science instruction as part of their environment studies course in class III. The contents of the curricula for science education have been improved and the teaching methods largely shifted from teacher-centred lessons to child-centred and activity-based methods. Though science education at the lower primary level is environmental based where it is imparted mostly through the common day observations, experiences and locally available material,but some special equipment and material are still needed for doing the activities and to capture the interest of the pupil. The Primary Science Kit developed by this department is an effort in the direction to improve the science education and it has been part of Operation Blackboard. Now to extent this facility to children of special need.

In the beginning, we focus on visually impaired children. The objectives of the project are :

(1) Adapt and modify science equipment and procedures to be appropriate for visually impaired students.

(2) Design and develop instructional material in which activities could effectively be used with visually impaired students in the mainstream/special settings.

(3) Develop awareness among the normal children about teaching science to the visually impaired students to enhance integration

This UNICEF assisted PIED project was undertaken in this department with effect from April, 1992. The first meeting with the experts in this field was held in the department from 22nd June to 26th June. Six participants from different institutes working in this area participated in the delibrations of the meeting. The participants were exposed to the Primary Science Kit, Teacher's Handbooks, prototype adapted equipment developed by this department and some of the items developed by NIVH as well.

The group further identified certain equipment and material to be adopted for use with visually impaired children from the primary science kit items. The details of the equipment and material are given separately.

In addition to this, some instructional material for the teacher was developed by the group on measurement to start with. It would help the teachers to make the students to learn basic concepts through touch, and through actions and experiments.

The following care has been taken to develop the activity instruction material:-

- Step by step presentation
- Science activities have been matched with the students abilities.
- Good experiments makes student want to share their results with others.
- Monitor student understanding ..... as necessary.

A second meeting was organised in this department involving teachers from schools of IED and special settings. Activity sheets were reviewed on the measurement package. We have now designed and developed the equipment and the finalised the activity sheets on measurement of length, volume of solids and liquids, temperature, weight. These will be tried out in various schools and further improved as the need arises. A survey is being undertaken to assess the situation of science teaching to visually impaired children at primary level in various Indian Schools.

2. TEACHING SCIENCE AND MATHEMATICS TO VISUALLY IMPAIRED CHILDREN THROUGH ADAPTED EQUIPMENT AND MATERIAL.

Philosophy

All children, disabled or non-disabled are children first. The disabled children is differently able to perform the same task as his normal counterpart and, therefore, it becomes imperative to provide them the necessary adapted aids and appliances commensurate with the nature of diability. Therefore, the teaching of maths and science to a disabled child will have the same impact as that of imparting scientific and mathematical knowledge to his/her normal counterpart.

The curriculum and methodology of teaching science to disabled children is the same as that of providing education to non-disabled children. The disabled children should be encouraged to follow the same curriculum(as far as practicable) to achieve the goal of scientific knowledge as their non-disabled counterparts. The teacher may have to adopt certain variations in the teaching methodology and may have to make improvisation of his own in teaching certain chapters of science and mathematics to disabled children.

Teaching of Science and Mathematics to a visually impaired child is as important as teaching the same subjects to his/her non-disabled counterpart. The blind child is deprived of vision and his writing and reading methodology is based on his sensitised and tactial fingers. The visual clues have to be transferred to non-visual conceptions through tactial deviations. It is because of these that the various apparatus used for teaching science to non disabled children may need modifications for teaching science to a visually impared child.

The aim of providing education to all children by the turn of the century as envisaged in the National Policy on Education (1986) cannot be achieved if each and every child is not brought under the framework of education.

Teaching of Science and Mathematics to children at the primary level is important on the following grounds:-

(1) Science Education enhances the process for scientific thinking.

(2) The modern world is now equipped with scientific developments and various mathematical & scientific computerised aids. To make effective use of those equipments, science education is extremely important.

(3) Science education facilitates the child to adopt the scientific norms of modern society. After attaining scientific knowledge through science education, the child is capable to expand his knowledge in all allied areas such as accountancy, engineering, medicine,etc.

During the past 1½ decades, the curriculum of Science and Mathematics has undergone manifold changes and computer knowledge and effective use of computerisation is gaining ground.. Therefore, all children in the country will have to be keep pace with the changing pattern of curriculum so that they can be at par with scientific development in the world.

The blind child will have to be given the necessary training with the help of adopted aids to develop his scientific knowledge.

Science and Mathematics should be compulsory subjects for all blind children up to the secondary level and the subjects should be taught by trained teachers who have graduated in the science stream. Necessary adaptations in scientific apparatus should be made to facilitate teaching of science to visually impaired children. Similar adaptations to teach mathematics

to visually impaire children by a specialised aids such as Tailyor Frame, Abacus and other devices should be taught to the visually impaired children.

Status of Development in India

The general study indicates that little work has been done in the area of teaching of science at primary school with a special reference to different types of disabilities. The same is the case in the teaching of science to visually disabled children

However, some work has been done by National Institute for Visually Handicapped at Dehradun. A brief report of their work is given below:-

Teaching of Mathematics

National Institute for the Visually Handicapped, Dehra Dun planned and took up a project entitled " Development of Appropriate Methodologies and Material for teaching Mathematics to the Visually Handicapped Children at Upper primary level in April 1988. This project was asisted by UNICEF. The syllabus prescribed by NCERT was considered ideal for identification of learning activities. There were some activities which needed no modification, whereas some of the activities required modification. The learning activities were modified and prototypes of corresponding learning aids using material such as board, beads, button, handmade paper, thread etc were developed. These teaching aids were finalised and finally a kit containing 14 teaching aids was developed. The items contained in the kit were found useful in giving different mathematical concepts such as number ordering, one-one correspondence, addition, place-value fraction, time and geometrical concept. The kit consisted of the following items.

1) Sorting Tray

It is a rectangular wooden box with separate partitions that

can be made into six, four and two portions. This tray can be used for giving different concepts such as ordering number mathematical operation using concrete objects such as marble, beads pebbles etc.

2) Unit cubes

Cubic rods of different lengths with groves may be used for ordering, addition, subtraction, etc.

3) Unit Cubes:

A cubical box containing grooved flats of 100 cubes longs of ten and small unit cubes may be used for giving concept of volume, decimal, and place value concepts.

4) Spike Board

A board containing six spikes with washers can be used for giving place value concept.

5) Slide Scale

A wooden scale with grove in the middle used to slide scales of different lengths on both sides of scale numbers from 1 to 18 in braille as well as ink-print is written. May be used for ordering additon and subtraction.

6) Number Board:

A rectangular board in which numbers from 1 to 100 in braille as well as ink print is written can be used for numbers and its operation skip counting multiples and factors.

7) Fraction strips tray

A wooden tray with strip and divided into ten equal parts used for addition and substraction of fraction and equivalent fraction.

8) Fraction Disc.

A wooden disc of whole and disc divided into two, three....ten equal parts included in aluminium container may be used for addition, substraction of fraction and equivalent fraction.

9) Calender in Braille:

A wooden calendar with two heptagonal disc in which outer disc is fixed and inner disc is rotating. In outer disc dates in gap of seven and in inner disc days and month all written the iner disc has tobe rotated once in every month. May be used for days and week relationship - days and month relationship etc.

10) Braille clock:

A geared model of clock with second minute and hour hand. Dial of clock is compossed as in braille watches. May be used for second-minute, minute-hour relationship and time concept.

11) Geometrical solids:

Six geometrical solids namely cube cuboidsphere, cylinder, cone and prism for giving two dimensional concepts of basic geometrical shapes.

12) Geometrical figures sorting tray:

An aluminium tray with five insets of rectangle, square, triangle circle andhalf circle with one box containing wired figures of three different sizes of those shapes. This tray is used for giving concept of basic geometrical shapes.

13) Magnetic Board

An Iron board with basic geometrical figures of triangle rectangle square and circle stick into it. The board is provided with flexible magnetic strips and magnetic bits. This board is used for drawing of geometrical shapes.

14) Geometry Device

A board with rubber pad and set of celophane paper. This device is provided with embossed scale, protactor compass and set squares. If we draw any line using ordinary pen impression comes up. This device is used for doing actual drawing of geometry by visually handi-capped students.

Teaching Science

NIVH took up another project entitled 'Teaching of Science' in May 1990 The project envisages developing classwise science kits for junior secondary classes.

In the first stage of this project, a science kit for teaching science to the visually handicapped children for class VI has been developed. This kit contains the following 10 items.

1. Stop watch
2. Liquid level indicator
3. Dial type thermometer
4. Inclined plane
5. Set of levers
6. Wind mill
7. Water mill
8. Spring balance
9. Thermoformed models and
10. Embossed diagrams(for replacing of diagrams)

In the kit some of the teaching aids were found useful in daily life situations also e.g. dial type thermometer can be used for taking body temperature and room temperature. It is very difficult for visually handicapped children to get the concept of amount of liquid poured in container. For which liquid level indicator having floating indicator which gives idea of 10ml, 20ml, etc. of any type of liquid has been designed.

The teaching aids contained in the kit have marking in both embossed as well as in ink-print form. Therefore, this kit is useful not only in special schools but also in integrated setting and for low vision and sighted children.

The above kit was tried out in different schools in actual class room situations. The responses received are encouraging.

1. Stop watch was found useful in number of activities such as in doing experiments, conducting braille reading/writing competitions and in sports activities.
2. Liquid level indicator was found useful in giving concepts of liquid at different level from 10ml. to 100ml.
3. Dial type thermometer was found useful in doing simple experiments for finding melting point of ice, boiling point of water etc.

4. Spring balance was found useful in giving concepts of different weights from 2 g. to 100 g.
5. Concepts of working procedure of wind mill and water mill can be given by models contained in the kit.
6. Number of simple experiments can be performed by set of levers and inclined plane.
7. Thermoformed models and embossed diagrams in the kit were found useful in giving very clear idea particularly in the study of natural sciences.

Some suggestions were also received for modifications of some of the items of the kit which are as under:

1. Second's hand of stop watch should be more stable.
2. In liquid level indicator embossed marking should be in the braille dots.
3. The lever of dial type thermometer should be small.

The kit will be tried out in some more schools in different part of the countries. After incorporating modifications in some of the items of kit, the science kit will be produced in large scale by NIVH. A manual for the use of these teaching aids will also be prepared in due course of time.

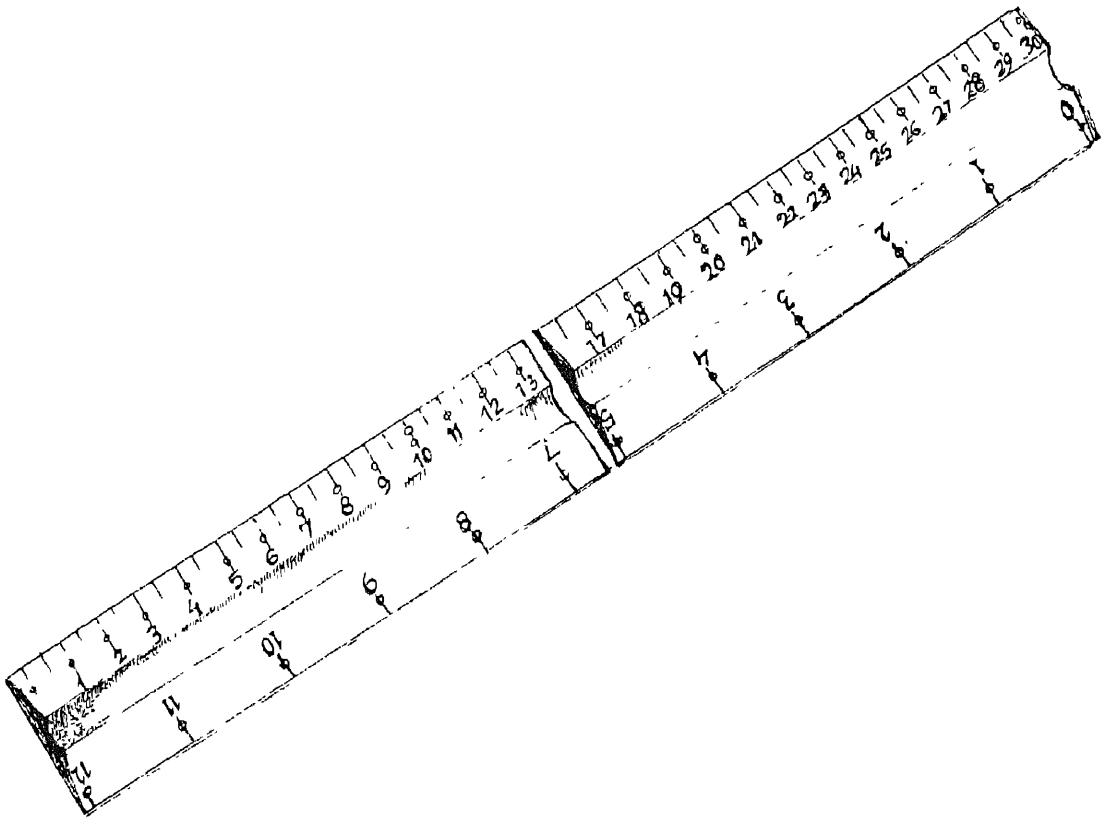
3. List of PSK items to be modified

S.NO.	Name of the item	Nature of modification
1.	Tailor measuring tape	one eyelet is to be fixed at each Cm mark whereas two eyelets at 0 and at multiple of 10cm. mark.
2.	Half meter scale	Eyelets should be fixed in the already existing holes.
3.	Measuring cylinder	A floating indicator should be provided with embossed as well as ink print scale.
4.	Centimetre cubes	Centimetre cubes should have holes and protrusions so as to fit one another.
5.	Spring balance	one side scale of the spring balance should be embossed.
6.	Plastic syringe	Grove should be made thicker along the piston.
7.	Thermometer	A dia type metallic thermometer (0°C-60°C) should be designed having bimetallic strip.
8.	Clock	Geared model of clock should be designed Pendulum system, one of the Integrated Science Kit items, can also be provided.
9.	Magnetic compass	Marking should be embossed and gap between needle and the scale should be about 2cm with removable top.
10.	Electric circuit board	Bulb should be replaced by toy motor.
11.	Water wheel	A thin metallic strip should be attached to an enclosure such that rotating wheel makes tick sound.
12.	Light probe	capable of distinguishing reflecting and non-reflecting surfaces, colour changes etc.
13.	Colour code	A colour code can be designed using distinguishing textures.
14.	Megnetic board	Iron sheet 25cmx25cm with small ferrite magnets and flexible magnetic rods.
15.	Globe	Line protrusion on the existing globe may be removed. Different continents with different textures and colour contract should be provided. Distination between plane and ocean areas should be made.

16.	Chart	Thermoformed models of (1) External features of plants and parts of plants(Selected) (2) Internal features of plants(selected) (3) Features of different type of animals like fish,frog,mammels,insects etc. (4) Human skelton,digestive system etc.

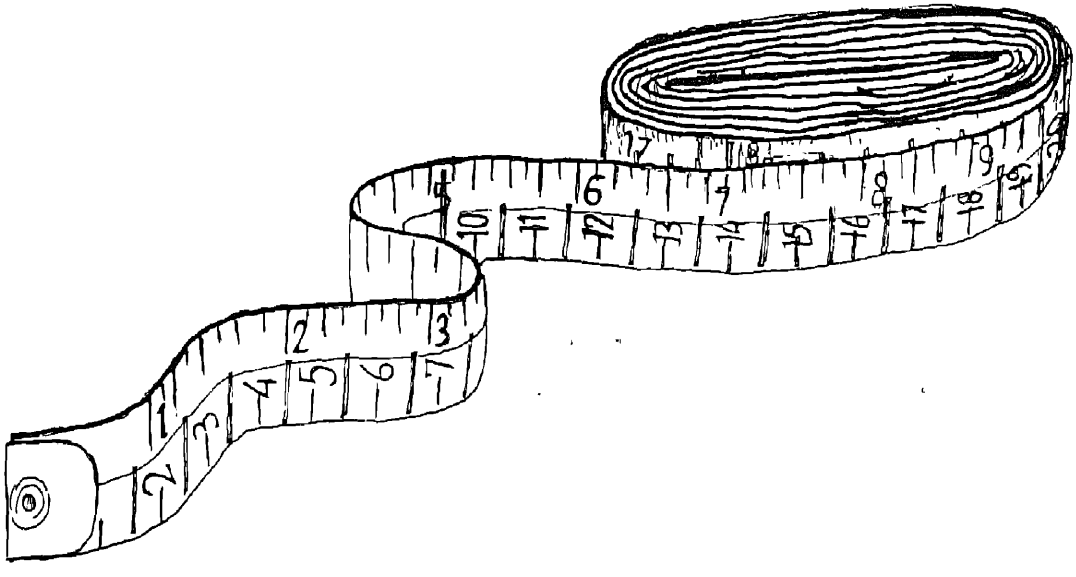
4. First prototype adapted equipment on measurement package including activities information sheets.

The first prototype equipment for measuring length, area, volume of solids, volume of liquids, weight and temperature to develop the skills in the children on basic measurement techniques at primary level are described here. Activity sheets have also been included on each technique.



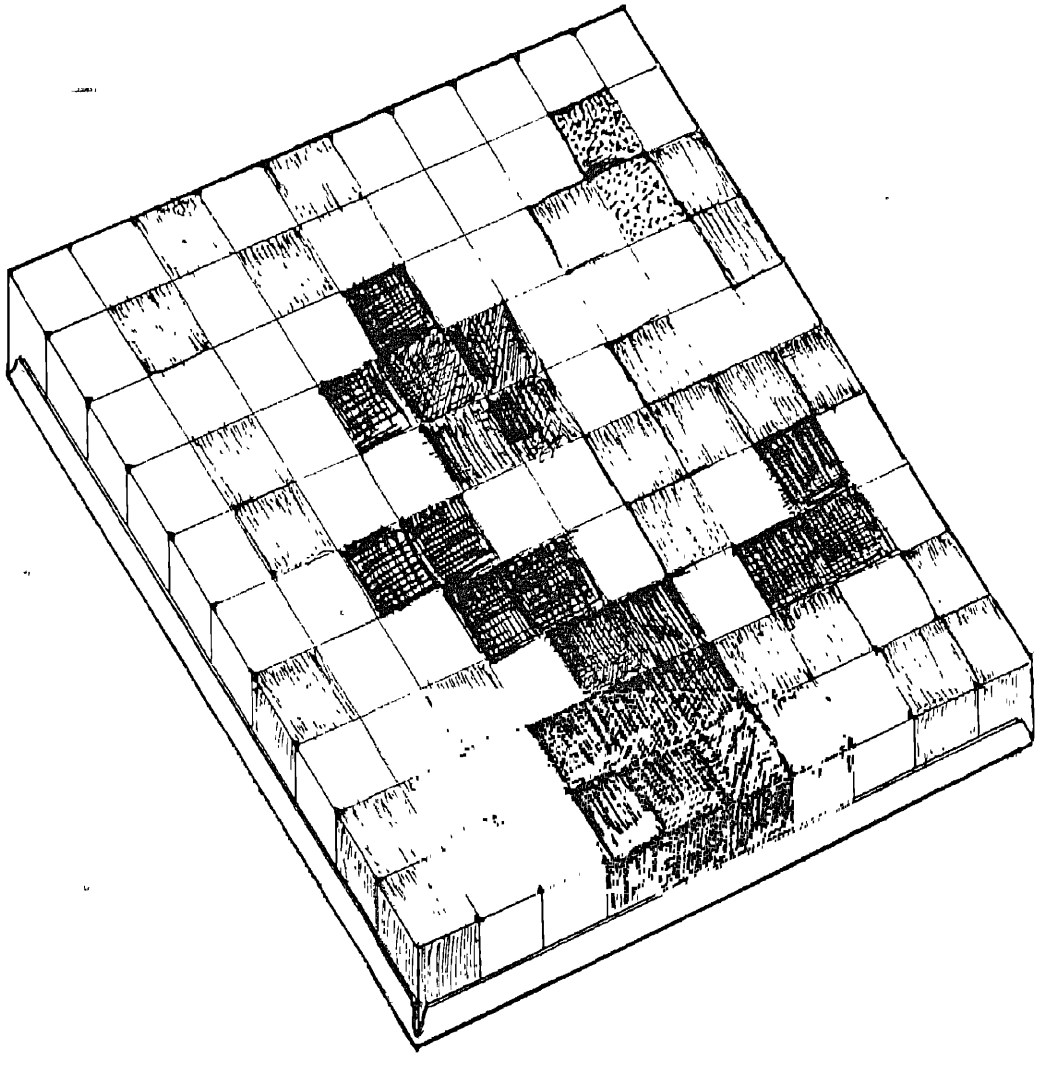
Embossed scale

The scale is embossed at each cm mark. Two embossed points are placed on ~~em~~ interval of 10cm. One embossed point is put on the adjacent inch side at each inch mark.



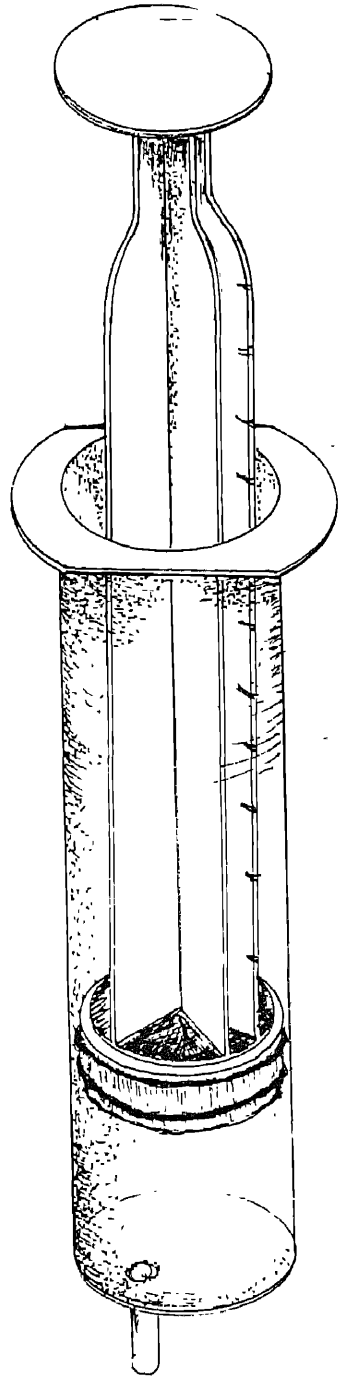
Embossed measuring tape

The tape has been embossed on the cm side only putting embossed mark at each cm. At 10cm mark and its multiple bigger embosssed mark is put.



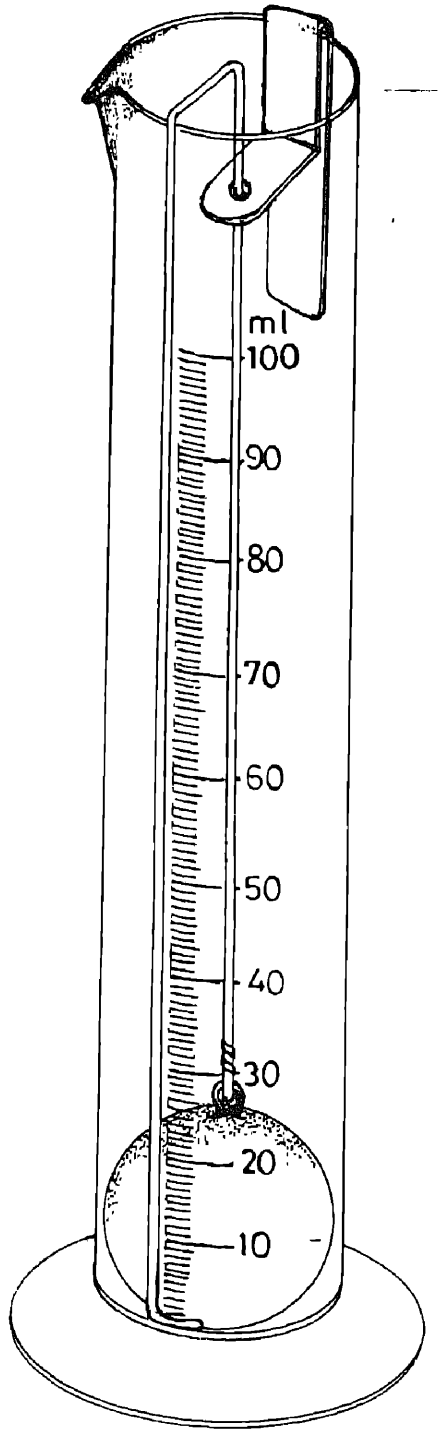
Tray with cm cubes

Each cube represents one unit in area on each of the surfaces as cm^2 and one unit in volume when all the surfaces are taken together as cm^3 . The tray accommodates 10 such cm cubes in a row.



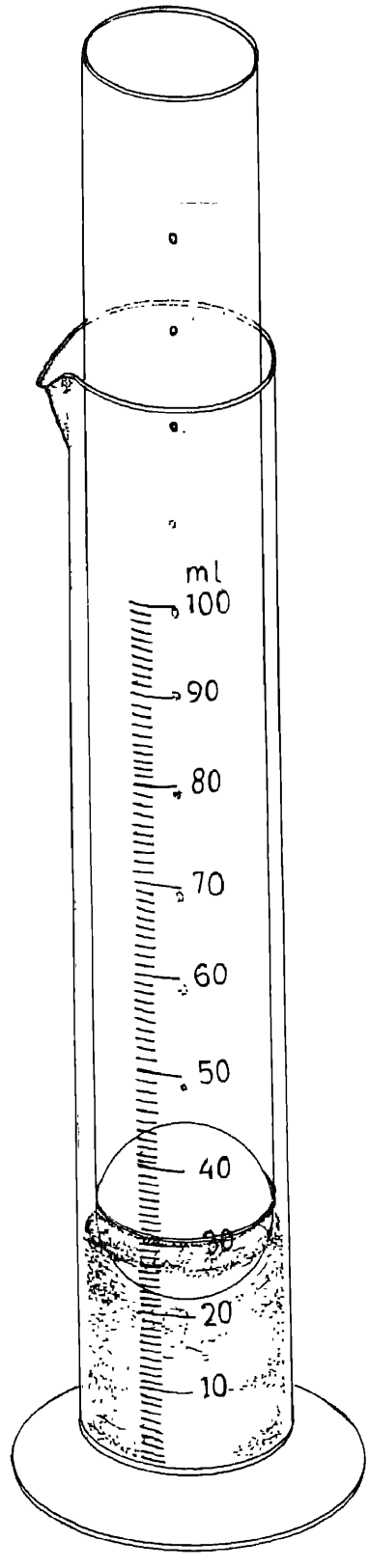
Syringe

The piston of the syringe has been grooved at an interval of 5ml. The topmost groove when aligned with the uppermost surface of the cylinder reads zero volumr. Second groove when aligned would read 5ml and so on.



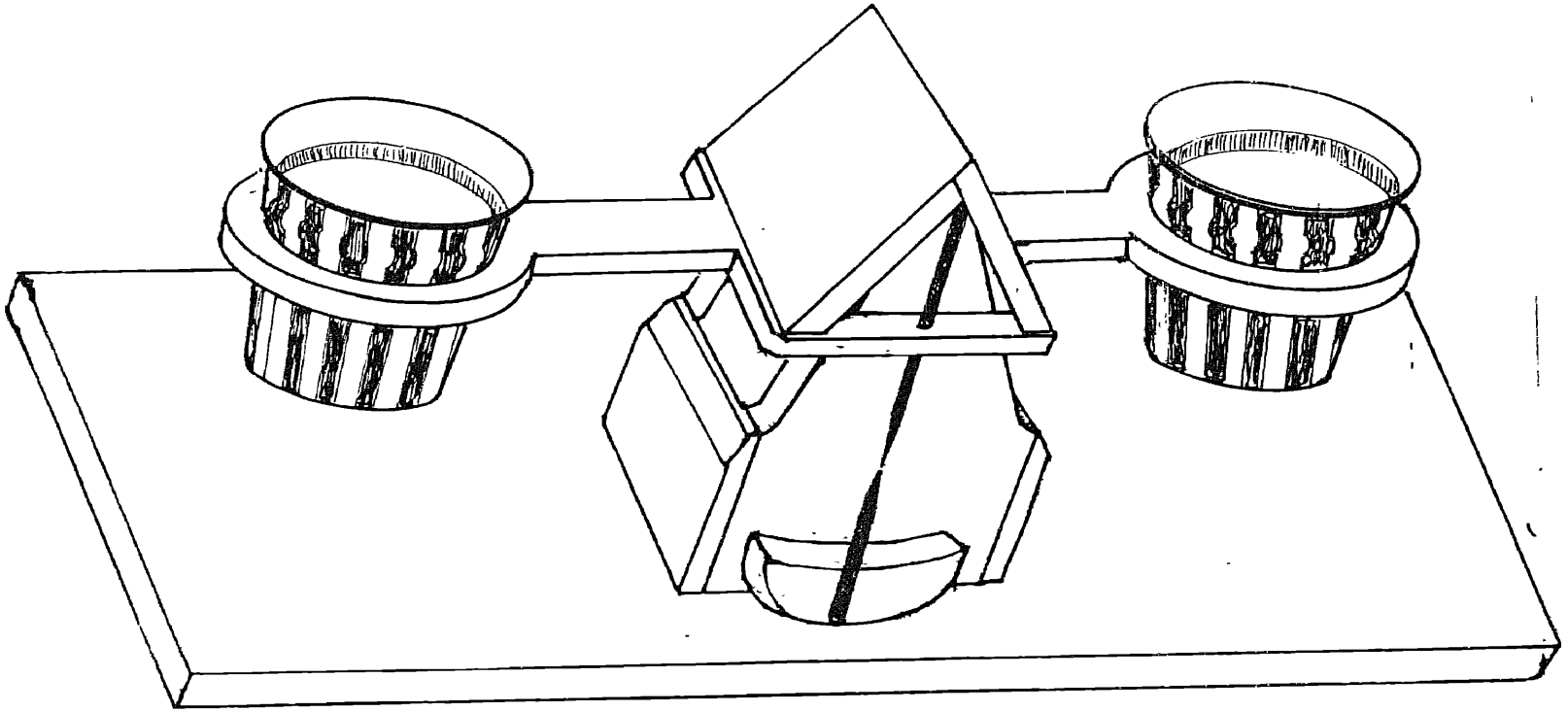
Measuring cylinder with floating indicator, type-2

Floating indicator of type-2 enables to find the level of a liquid in the cylinder/container directly. The pointer outside the cylinder indicates the level.



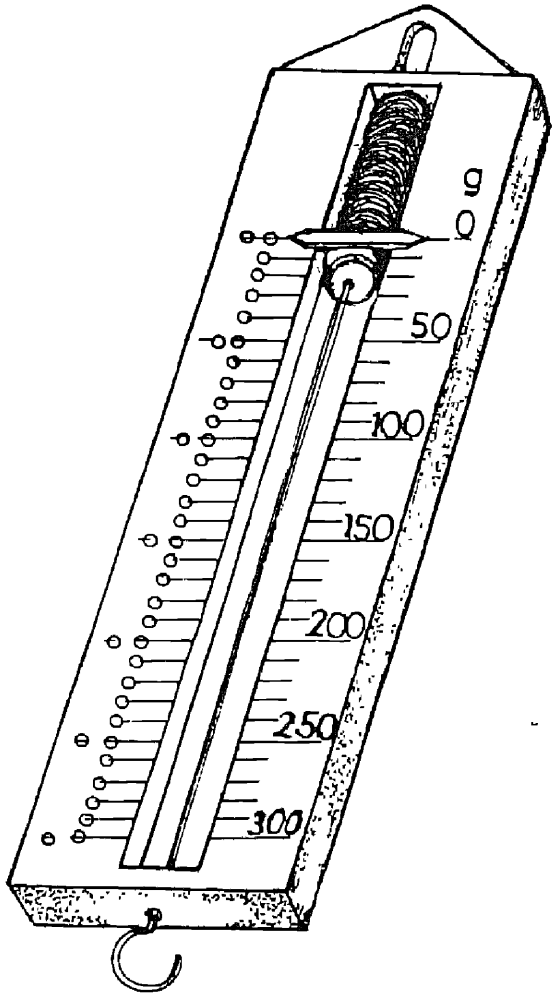
Measuring cylinder with floating indicator, type-1

(a) Floating indicator has been designed in two types. Type-1 reads the volume of the liquid in the cylinder from top of the indicator. The topmost embossed point indicates zero volume. Each subsequent embossed point is placed at an interval of 10 ml.



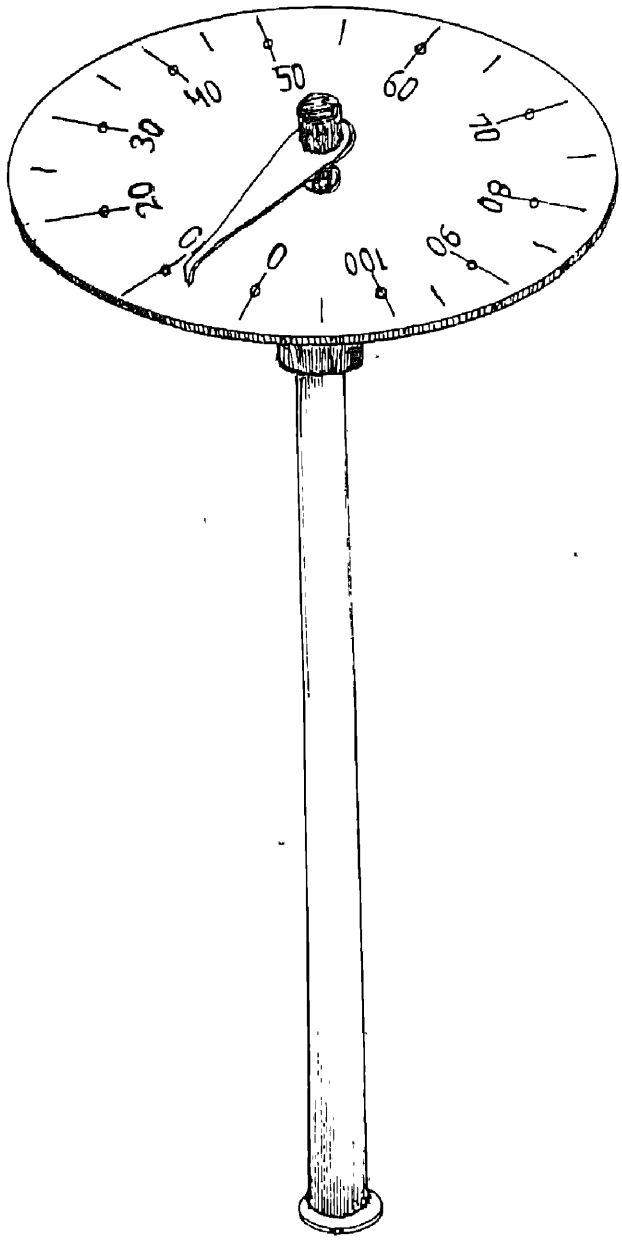
Two-pan balance

Two-pan balance enables to find out the mass of an object. Weights of 1g, 2g, 5g amd 10g are provided. Balancing is indicated when the two pointers align.



Spring Balance

Spring balance enables to find out the weight of an object by suspending it from hook of the balance. The scale has been embossed on one side. Each embossed point represents 10g. Two embossed points are put at the interval of 50 g.



Dial type thermometer

The scale of the thermometer is embossed at an interval of 10° C. The thermometer reads from 0° C to 100° C.

1. HOW DO WE MEASURE LENGTH?

Learning Outcome	Suggested Teaching Steps	Equipment/Material
Develop skill to use the scale and measuring tape to measure the length.	Involve the students in discussion about different objects in their day to-day use e.g. different lengths of fingers of hand. Allow the visually impaired students to feel the embossed scale. Tell them that the numbers are embossed on the scale from 0 to 30cm. It is embossed both in cm. & inches. The distance between two embossed points is 1 cm on one side & 1 inch on the other side.	Embossed scale.
	Activity I Take a wire/thread (in complete cm) and help them to measure it by placing one end of wire at first embossed point and extend the wire or thread until another end of thin wire/thread. Ask them to count the embossed points. Allow them to repeat this exercise with another wire/thread of different length.	Wires/threads in complete cm
	Activity II Ask them to measure lengths of pencils, sides of braille slates & books. What differences do you find in lengths of different wires? Ask them to list the results in a tabular form.	
	Name of object — Length in cm Wire Braille slate Book Table	
	Allow them to feel the embossing on the tape and tell them that the measurement is similar to that with the scale. However, the tape is used conveniently for bigger objects.	Embossed measurement tape
	Activity III Ask them to measure lengths of a table. What difference do you find in the lengths of different sides of a table?	

2. HOW DO WE MEASURE AREA OF SOLIDS?

Learning Outcome	Suggested Teaching Steps	Equipment/Material
Develop skill to measure area	Involve the students in discussion about length and breadth of the planar objects. Activity I Provide them two/three paper sheets, books etc. having different area. Ask them to arrange these in increasing order of their size. Let them measure the sides of each objects. Ask them to list their values and to calculate the area. Activity II Provide them cm.cube blocks and let them join these in two directions and then count these cubes surfaces in one plane. Ask them to measure each side of that surface. Let them find the relationship between number of cubes surfaces in that plane and surface area (length x breadth). Make them understand the unit of surface area in terms of small cube surface. Activity III Provide them the measuring tape and let them measure area of bigger objects like table, etc. in the classroom.	Scale, measuring tape, cm.cubes paper/card board sheets in complete cm

3. HOW DO WE MEASURE VOLUME OF SOILDS?

Learning Outcome	Suggested Teaching Aids	Equipment/ Material
Develop skill to measure volume of solids	Involve the students in discussion about length, breadth and height of objects like table etc. Activity I Provide them cm cubes. Let them join these in two directions and then count these unit surfaces in two planes. Ask them to measure each side of surfaces in the two planes. Let them find the relationship between number of cubes and volume (lengthxbreadthxheight) Make them understand the unit of volume as small cube. Activity II Provide them two/three books having different volume of solid. Ask them to arrange in increasing order of their size. Let them measure each side of every object Ask them to list their values of each side and calculate volume as(lengthxbreadthxheight). Activity III Provide them the measuring tape and let them measure volume of bigger objects like box table etc.	Scale, measuring tape,cm cube, boxes having length, breadth, and height in complete cm

4. HOW DO WE MEASURE VOLUME OF LIQUID?

Learning Outcome	Suggested Teaching Steps	Equipment/Material
Develop skill to measure volume of liquid.	Involve the students in discussion about length, breadth & height of a container like solids. A liquid is kept in these containers. Involve them in discussion about quantity of milk in a bottle, oil in a can etc. used in their daily life experience. How do we know about the quantity of the liquid in a container? A measuring cylinder is used to know the quantity of liquid in 1000 ml=1 litre. We use a floating indicator to know the level of the liquid in the cylinder. Upper most mark shows no liquid and subsequent marks indicate volume in increment of 10 ml. Activity I Let the student fill the small container with water. Ask him to transfer this water into big container. Let him repeat this till the big container is full of water. Let him note the number of times he has to transfer the water from small container into big container. Activity II Take a small amount of water into the cylinger. Put the floating indicator in the cylinder. Let the student feel the position of the markings on it. Let them count the points and note the volume.	Small container, big container, floating indicator, measuring cylinder, water

5. HOW DO WE MEASURE WEIGHT?

earning Outcome	Suggested Teaching Steps	Equipment/Material
evelop skill to easure weight	Involve the students in discussion about two objects of iron & wood. Ask them to tell the difference in weight between them by holding one in each hand. What is weight of your body? Provide the students some heavy and light objects. Let the students feel which one is heaviest and which one is lightest by holding each of them in hand in turn. How much vegetables does your mother but at a time? How are these weighted in the market? Weight of an object measured in grams with a weighing balance. Activity I Provide the students some wooden or iron objects. Let them measure the weight of the object with the help of spring balance by suspending these with the help of threads. Each embossed point represents 10 g. Activity II Provide the students different sizes of wooden objects. Ask them to measure these in two pan balance. Note: Weight of an object is measured by spring balance and expressed in gram-weight. Mass of the object is measured by two-pan balance, and expressed in grams(g).	Spring balance, two pan balance, weights, thread

6. HOW DO WE MEASURE TIME?

Learning Outcome	Suggested Teaching Steps	Equipment/Materia
Develop skill to measure time.	Involve the students in discussion about the time. - When do you get up? - When do you go to school? - When do you return home ? Activity I Set the watch at 12 O'clock, then rotate the second hand through a complete rotation. Allow the children feel the minute hand. It moves by one point. Make the student understand that 60 seconds make one minute. Rotate the minute hand through a complete rotation. Let them feel the hour hand. It moves by one point. Make the students understand that 60 minutes make an hour. Let them repeat on their own. Activity II Set the watch at 12 O'clock. Then ask the students to read the different times like 12.10 12.20, 12.25, 12.30, 12.45 etc. Get the watch set at 10.05, 11.20, 11.30, 11.45 etc. Ask the students about time readings and afternoon i.e. 12 O'clock. Make them understand that for forenoon time, we write 'am' and for afternoon time, we write 'pm' against the reading of the time.	Dial type watch.

7. HOW DO WE MEASURE TEMPERATURE?

Learning Outcome	Suggested Teaching Steps	Equipment/Material
Develop skill to measure temperature	Involve the students to discussion about hotness and coldness of objects and food stuffs, water and body temperature. Activity I Place the thermometer in cold water and let the students feel the needle and note down the reading on the thermometer dial. Then warm the water and let them feel the warm water by dipping their fingers in the warm water and then the needle again & note down reading on thermometer dial. Ask the students to correlate this temperature with the warmth of the water. The degree of hotness or coldness of a body or an object is called temperature. The unit of temperature is degree Celcius(C). Activity II Provide warm water upto 40 C. Ask them to measure temperature of the water and note down the reading. Them mix small amount of cold water and then again ask them to note down the reading. Activity III Ask them to listen daily about minimum and maximum temperature on Radio & TV and relate these with their feeling of warmth/ coolness in different weathers.	Dial type thermometer, a small cane, ice,water

PROFORMA FOR THE HEADMASTER

1. Name of the school and address :.....

.....

2. How many teachers teach science in your school ?

   (i) In class III

   (ii) In class IV

   (iii) In class V

3. How much time do your teachers spend on science teaching in the classes ?

   (i) In class III

   (ii) In class IV

   (iii) In class V

4. Do you have any resource room in your school ?

   If yes, what are the equipment in your resource room ?

5. Which equipment/material are available for science teaching in your school ?

6. Would you like to use science kits or loose science material for your school ?

   Yes No

   If Yes, mention which ones ?

7. How many students are there in your school ?

   (i) In class III

   (ii) In class IV

   (iii) In class V

8. How many number of students in each disabled group are in classes III, IV and V ?

   (i) Visually Impaired

   (ii) Hearing Impaired

   (iii) Mentally Retarded

   (iv) Physically Handicapped

9. What would help to improve science teaching in your school ?

10. Do disabled children drop out from the school ?

    Yes No

    If yes, give number of students which dropped out for the last three years ?
    Specify the reasons.

PROFORMA FOR THE SPECIAL TEACHER

1. Name of the school .....

   Address.....

2. Name of the Teacher/Special Teacher.....

3. Male or Female Teacher .....

4. To which age group do you belong ?

   (i) 20 to 29 years

   (ii) 30 to 39 years

   (iii) 40 to 49 years

   (iv) 50 and above

5. What is your school teaching experience ?

   (i) Less than 5 years of primary school

   (ii) 5 years & above of primary school

6. What is your professional qualification ?

   (i) No teacher training

   (ii) In-service training

   (iii) J. B. T.

   (iv) B. Ed. general/B, Ed. special

   (v) M.Ed. general/M Ed. special

   (vi) Advanced diploma in Special Education

   (vii) Certificate in Special Education.

7. What is your academic qualification ?

   (i) Matric

   (ii) Higher Secondary

   (iii) B.A./M.Sc /M. Com.

   (iv) M.A./M.Sc./M.Com.

8. Did you specialise for any subject during your training ?

   Yes No

   If yes, which subject ?

9. In the school, do you teach all subjects or some ?

   (i) I teach all subjects

   (ii) I teach only some subjects ; name them.

10. In which class do you teach science ?

    (i) In class III

    (ii) In class IV

    (iii) In class V

11. How much time do you spend on science teaching in the classes ?

    (i) In class III

    (ii) In class IV

    (iii) In class V

12. Are you satisfied with your science teaching ?

    Yes No

    If no, why not ?

13. How do you teach science to visually handicapped children ?

    (i) Reading from textbook

    (ii) Helping the students to do activities

    (iii) Any other way

14. Which science textbook/reading materials are used by the visually handicapped students in the classes ?

    (i) In class III

    (ii) In class IV

    (iii) In class V

15. Does the school have any teaching aids ?

    (i) Maps/charts/diagram

    (ii) Model

    (iii) Science kits

16. Do you have the facility of a resource room ?

    If yes, which teaching equipment ?

17. How do you utilize the resource room for teaching science to visually impaired children ?

18. What would help visually handicapped children to learn science ?

PROFORMA FOR THE TEACHER

1. Name of the school.....

   Address .....

2. Name of the Teacher/Special Teacher.....

3. Male or Female Teacher .....

4. To which age group do you belong ?

   (i) 20 to 29 years

   (ii) 30 to 39 years

   (iii) 40 to 49 years

   (iv) 50 and above

5. What is your school teaching experience ?

   (i) Less than 5 years of primary school

   (ii) 5 years & above of primary school

6. What is your professional qualification ?

   (i) No teacher training

   (ii) J. B. T.

   (iii) B. Ed.

   (iv) M.Ed.

7. What is your academic qualification ?

   (i) Matric

   (ii) Higher Secondary

   (iii) B.A./M.Sc /M. Com.

   (iv) M.A./M.Sc./M.Com.

8. Did you specialise for any subject during your training ?

   Yes No

   If yes, which subject ?

9. In the school, do you teach all subjects or some ?

   (i) I teach all subjects

   (ii) I teach only some subjects ; name them.

10. In which class do you teach science ?

    (i) In class III

    (ii) In class IV

    (iii) In class V

11. How many periods do you teach science per week ?

    (i) In class III

    (ii) In class IV

    (iii) In class V

12. How many number of visually impaired children are there in your school ?

    (i) In class III

    (ii) In class IV

    (iii) In class V

13. Are you satisfied with your science teaching ?

    Yes No

    If no, why not ?

14. How do you teach science ?

    (i) Reading from textbook

    (ii) Helping the students to do activities

    (iii) Using equipment/aids

    (iv) Any other way

15 Do you produce your own teaching aids ?

    Yes No

    If Yes, which ones.

16. Which equipment and material are available for science teaching in your school ?

17. Which equipment and material are used in the classes ?

18. What would help to improve science teaching in your school ?

List of participants in the two meetings held at WD,NCERT, New Delhi. Ist meeting (22nd - 26th June,1992)

1. Mr. Kalyan Kumar Sengupta,
   143/1, Indra Biswas Road,
   Calcutta - 700 037.

2. Mr. V.C. Kimothi,
   Regional College of Education,
   Ajmer.

3. Mr. Rakesh Gujral,
   National Institute for the Visually Handicapped,
   116, Rajpur Road,
   Dehradun - 248001

4. Mr. C.D. Tamboli,
   Reader, DTESE&ES,
   NCERT, New Delhi - 110016

5. Mr. Krishan Chand,
   Junior Project Fellow,
   WD, NCERT,New Delhi - 110016

6. Dr. H.O. Gupta,
   Reader,
   WD, NCERT, New Delhi - 110016

IInd meeting (20th - 22nd July, 1992)

1. Mr. Satyapal Singh Panwar,
   M.C. Primary School,
   Shahpur Jat (Boys)
   New Delhi - 110016£

2. Mrs.Shakuntla Sharma,
   Rastriya Virjanand Andh Kenya
   Sr. Sec. School,
   New Rajendra Nagar,
   Shankar Road,
   New Delhi - 110 006

3. Shri Krishan Chand,
   J.P.F.,
   WD. NCERT,New Delhi - 110016

4. Dr.H.O.Gupta,
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   New Delhi - 110016